

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE SPECIFICATION**

**POND SEALING OR LINING - BENTONITE TREATMENT**

(No.)  
Code 521C

**DEFINITION**

A liner for a pond or waste impoundment consisting of a compacted soil-bentonite mixture.

**PURPOSE**

To reduce seepage losses from a pond or waste impoundment for water conservation and environmental protection.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies where:

- Soils are suitable for treatment with bentonite.
- A pond or waste impoundment requires treatment to reduce seepage rates and to impede the migration of contaminants to within acceptable limits.

**CRITERIA - ALL PURPOSES**

Bentonite treated soil liners shall comply with all federal, state, and local laws, rules, and regulations.

Lined structures shall meet all applicable NRCS standards.

Bentonite treated soil liners shall be filter compatible with the natural foundation materials on which they are compacted according to Chapter 26, Part 633 of the National Engineering Handbook.

The minimum thickness of the finished compacted liner shall be 6 inches.

The bentonite shall be a sodium bentonite with a free swell of at least 22 milliliters as measured by ASTM Standard Test Method D5890, unless laboratory tests using other

bentonite types are used for design.

When laboratory permeability tests are required to determine application rates, the tests shall be performed using bentonite of the same quality and fineness as that proposed for use.

Personnel on site during bentonite application and mixing shall wear mask and goggles, for protection against bentonite dust. Provisions will also be made to minimize off-site dust.

**CRITERIA - PONDS**

In the absence of laboratory tests or field performance data on soils similar to those to be treated, the minimum application of finely ground bentonite per 1-inch thickness of constructed liner shall be:

Pervious Soil Description	Application rate (lb/ft <sup>2</sup> )
Silts (ML, CL-ML)	0.375
Silty Sands (SM, SC-SM, SP-SM)	0.5
Clean Sands (SP, SW)	0.625

In the absence of more detailed testing and analyses, liner thickness shall be according to the following table:

Water Depth (feet)	Liner Thickness (inches)
8 or less	6
8.1 – 16	12
16.1 – 24	18
24.1 - 30	24

**CRITERIA - WASTE IMPOUNDMENTS**

Design of the bentonite treated soil liner for a waste impoundment

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shall be in accordance with National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 10, Appendix 10D, and/or state regulatory requirements.

The liner shall be protected against desiccation cracking, the effects of water surface fluctuations, wave action, surface erosion, erosion from pipe inlets, agitation equipment, animals, or items installed through the liner. Protective measures shall be designed into the system to protect the liner for these cases. At least 6 inches of compacted soil cover shall be placed over the soil-bentonite liner.

### **CONSIDERATIONS**

Flatten the embankment slopes of the pond or waste impoundment to facilitate compaction efforts during construction. The stair-step method of construction as outlined in Appendix 10D may be considered in lieu of slope flattening.

A protective compacted soil cover should be considered for protecting the soil-bentonite liner for ponds.

Consider using a flexible membrane liner for sites that have water depths greater than 24 feet.

Consider weather conditions such as wind and precipitation when planning construction.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for a bentonite treated soil liner for a pond or waste impoundment shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans and specifications shall include such drawings, specifications, material requirements, quantities, construction requirements, equipment requirements, and other documents as are necessary to describe the work to be done.

### **OPERATION AND MAINTENANCE**

Maintenance activities required for this practice consist of those operations necessary to prevent damaging the treated soil liner. This includes, but is not limited to, excluding animals and equipment from the treated area, protection of the liner during initial filling, agitation, or pumping operations, and repair of disturbed or eroded areas.